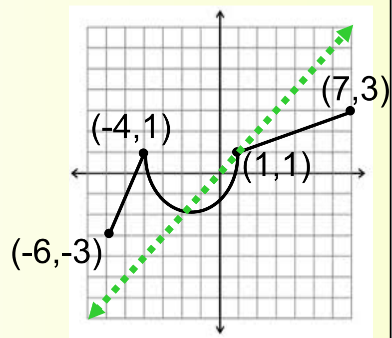
Alg. 2 Warm Up #3- 2

1. Write an equation for $f^{-1}(x)$, state the domain and range for both f and f^{-1}.

$$f(x) = 4(x - 5)^2 + 7, \quad x \le 5$$

2. Graph the inverse, state domain and range of both.



HW Questions: Review & Preview

5-73. Let $y = \log_2(x)$. Rewrite the equation so that it begins with $x =$. Think about how you defined $y = \log_2(x)$ if you get stuck. Put a large box around both equations. Do the two equations look the same? Do the two equations mean the same thing? Are they equivalent? How do you know? This is very important. Think about it, and write a clear explanation.

$\boxed{y = \log_2 x}$ $\quad$ $\boxed{x = 2^y}$

exponent

5-74. Every exponential equation has an equivalent logarithmic form and every logarithmic equation has an equivalent exponential form. For example:

$$\overset{\text{exponent}}{4^3} = 64 \quad \text{is equivalent to} \quad 3 = \log_4 64$$

base — exponent — base

Copy the table shown below and fill in the missing form in each row.

	Exponential Form	Logarithmic Form
a.	$y = 5^x$	
b.		$y = \log_7(x)$
c.	$8^x = y$	
d.	$A^K = C$	
e.		$K = \log_A(C)$
f.		$\log_{1/2}(K) = N$

5-75. Suppose you want to buy sugar. Packages of different sizes cost different amounts, but the relationship is not always proportional. That is, a bag twice as big does not usually cost twice as much. The chart shows the prices for various sizes of bags of sugar.

		Price per pound
½ lb bag	$0.95	$\frac{0.95}{0.5} = \$1.90$ per pound
1 lb bag	$1.38	
2 lb bag	$1.92	$\frac{\$1.92}{2} = \$0.96$ per pound
5 lb bag	$4.70	
10 lb bag	$9.04	$\frac{9.04}{10} = \$0.90$ per pound
20 lb bag	$17.52	

a. Find the rates in cost per pound. (Stores refer to this as unit pricing.)

b. Does the unit price increase or decrease with the size of the bag?

c. Does the unit rate change more drastically for smaller sizes or for larger sizes?

check difference between unit prices for small bags

compare that to differences between unit prices of large bag

5-76. Although the Quadratic Formula always works as a strategy to solve quadratic equations, for many problems it is not the most efficient method. Sometimes it is faster to factor or complete the square or even just "out-think" the problem. For each equation below, choose the method you think is most efficient to solve the equation and explain your reason. Then solve the problems that can be factored.

a. $x^2 + 7x - 8 = 0$

b. $(x+2)^2 = 49$

c. $5x^2 - x - 7 = 0$

d. $x^2 + 4x = -1$

$x^2 + 4x + \_\_ = -1 + \_\_$

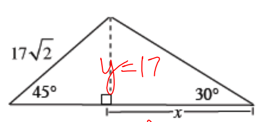
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$a = 5$
$b = -1$
$c = -7$

5-77. If $10^{3x} = 10^{(x-8)}$, solve for x. Show that your solution works by checking your answer.

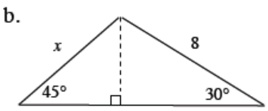
5-78. Find the value of x in each diagram below.

a.

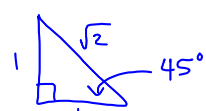


long leg.

b.

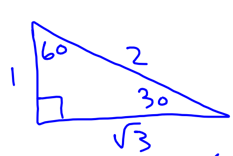


use special Δ's:



hypotenuse $= \sqrt{2}$(leg)

$\frac{17\cancel{\sqrt{2}}}{\cancel{\sqrt{2}}} = \frac{\cancel{\sqrt{2}}(y)}{\cancel{\sqrt{2}}}$



hypotenuse = 2(sh. leg)

long leg $= \sqrt{3}$(sh. leg)

$x = \sqrt{3}(17)$

$\boxed{x = 17\sqrt{3}}$

5-79. Consider the function defined by inputs that are the length of the radii of a circle, and the outputs are the areas of those circles. Write the equation for this function and investigate it completely.

Multiple representations
domain, range
Special points?
Symmetry?
asymptotes?

x = radius
y = area of circle

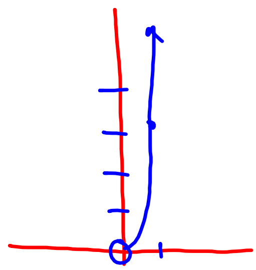
$A = \pi r^2$

$\boxed{y = \pi x^2}$

x	y
0	0
1	π

dom: $x > 0$.

range: $y > 0$



* only half the parabola because x = radius so $x > 0$

5-80. Consider the equation $y = (x+6)^2 - 7$.

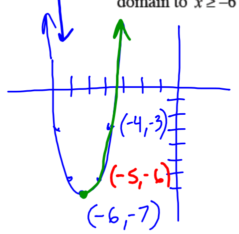
a. Explain completely how to get a good sketch of the graph of $y = (x+6)^2 - 7$. left 6, down 7, no stretch or compression

b. Explain how to change the graph from part (a) to represent the graph of $y = (x+6)^2 + 2$.

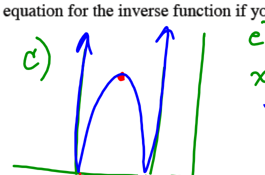
c. Given your original graph, how can you get the graph of $y = |(x+6)^2 - 7|$?

d. Restrict the domain of the original parabola to $x \geq -6$ and graph its inverse function.

e. What would be the equation for the inverse function if you restricted the domain to $x \geq -6$?



c)



make all the outcomes (y-values) positive.

e) Inverse:
$x = (y+6)^2 - 7$
Now solve for y.

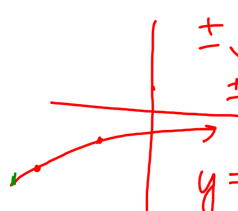
$\pm\sqrt{x+7} = \sqrt{(y+6)^2}$

$\pm\sqrt{x+7} = y+6$
$\quad -6 \qquad -6$

$y = \pm\sqrt{x+7} - 6$

x	y
-7	-6 start
-6	-5
-3	-4

(-7,-6)



inverse: $y = \sqrt{x+7} - 6$

dom: $x \geq -7$

Blue CP's from yesterday:

5-69. ANOTHER LOGARITHM TABLE

Lynn was supposed to fill in this table for $g(x) = \log_5 x$. She thought she c
use the log button on her calculator, but when she tried to enter 5, 25, and
she did not get the outputs the table below displays. She was fuming over
long it was going to take to guess and check each one when her sister sug
that she did not have to do that for all of them. She could fill in a few mo
then use what she knew about exponents to figure out some of the others.

x	$\frac{1}{25}$	$\frac{1}{5}$	$\frac{1}{2}$	1	2	3	4	5	6	7	8	10	25	100	125
$g(x)$	−2	−1		0	0.43	0.68	0.86	1	1.11		1.29	1.43	2	2.86	3

b) $5^0 \quad 5^{g(x)} \quad 5^1$

$1 \quad 2 \quad 5$

$\boxed{2 \approx 5^{0.43}}$

$g(2) \approx 0.43$

$5^0 \quad 5^{g(x)} \quad 5^1$

$1 \quad 3 \quad 5$

$\boxed{3 \approx 5^{0.68}}$

$g(3) \approx 0.68$

$5 \cdot 2 = 10$

$5^1 \cdot 5^{0.43} \approx 10$

$(5^{1.43})^2 \approx 10^2$

$5^{2.86} \approx 100$

69b) Show thinking:

Use relationships with 2 to get 4 & 8.

$2^2 = 4 \longrightarrow$ use $2 \approx 5^{0.43}$

$(5^{0.43})^2 \approx 4$

$5^{0.86} \approx 4$

So: $g(4) \approx 0.86$

Now for $8 \rightarrow 2^3 = 8$

$(5^{0.43})^3 \approx 8$

$5^{1.29} \approx 8$

$g(8) \approx 1.29$

5-70. Find each of the values below, and then justify your answers by writing the equivalent exponential form.

a. $\log_2(32) = ?$ b. $\log_2(\frac{1}{2}) = ?$ c. $\log_2(4) = ?$ d. $\log_2(0) = ?$

e. $\log_2(?) = 3$ f. $\log_2(?) = \frac{1}{2}$ g. $\log_2(\frac{1}{16}) = ?$ h. $\log_2(?) = 0$

5-71. While the idea behind the Ancient Puzzle is more than 2100 years old, the symbol **log** is more recent. It was created by John Napier, a Scottish mathematician in the 1600's. "log" is short for **logarithm**, and represents the function that is the **inverse of an exponential function**. You can use this idea to find the inverse equations of each of the following functions. Find the inverses and write your answers in y = form.

a. $y = \log_9(x)$ b. $y = 10^x$ c. $y = \log_6(x+1)$ d. $y = 5^{2x}$

Switch x & y for inverse:

$x = \log_6(y+1)$

Now write in exponent form:

$6^x = y+1$

Solve for y:

$\boxed{y = 6^x - 1}$

CP's: 5.2.3 Salmon worksheet

Remember: Investigating a function

Multiple representations
Domain and Range
Intercepts
Special Points
Symmetry
Asymptotes
Continuous or Discrete
Shape: curved or straight

HW: 5 -

84 ---> 92

Thursday's Short Quiz:

* Write an inverse equation.
* Graph an inverse, state domain & range.
* Solve a multi step absolute value inequality.